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## Disclaimer

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## What is Metacognition?

Thinking about thinking

Becoming the audience to our own performance

Inner voice: Verbalizing our internal thoughts in order to make sense of something

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## What is Metacognition?

The process used to plan, monitor, assess, and manipulate one's understanding of information and performance

It includes an awareness of  
-one's thinking and learning  
-oneself as a thinker and a learner.

N. Chick, Center For Teaching, Vanderbilt University

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## What is Metacognition?

The ability to

- Use prior knowledge to plan a strategy for approaching a learning task
- Take the necessary steps to problem solve
  - Reflect on and evaluate results
  - Modify one's approach if needed.

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## Metacognition

Is an Executive Skill

Develops over time

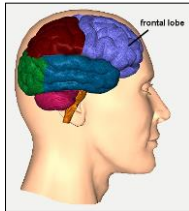
Depends on a knowledge base

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**Metacognition is an executive function,  
which is localized in prefrontal  
structures of the frontal lobe.**

(Pennington and Ozonoff, 1996)



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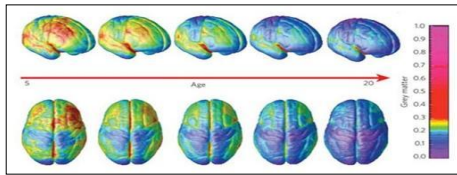
## Functions of the Prefrontal Cortex

- **Integration and association (Highest order)**
- Flexible behavior
- **Using past experiences to plan and modify behavior**
- Making decisions based on reward
- **Selecting and regulating appropriate responses and behaviors**
- Mediating affect and emotion
- **Incorporating past experiences and sensory input with internal impulses and emotions**
- Initiating, selecting and organizing relevant behaviors
- **Storing and managing verbal and visual working memory**
- Sustaining attention
- **Providing temporal memory and organization**
- Accessing episodic long-term memory
- **Making inferences and decisions**
- Evaluating outcomes and new learning by association while engaged in task or behavior

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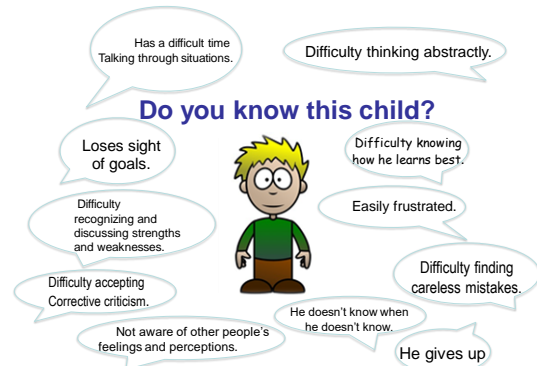
## The Development of the Frontal Lobe



- Begins before birth and continues until early adulthood.
- Growth spurts occur between:
  - 5-7 years
  - 9-12 years
  - in adolescence.

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## Why teach Metacognitive skills?

1. Metacognition plays a critical role in successful learning
2. Helps students become intentional learners
3. Research shows that metacognitive skills can be taught.

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## Cognition vs Metacognition

### Cognitive Strategies



- The basic mental abilities we use to think, study, and learn (recalling information from memory, inferencing, comparing/contrasting,)
- Help us achieve a particular goal
- can be measured: answering questions, solving a math problem.

### Metacognitive Strategies

- Used to ensure that a learning goal is being or has been reached
- Involves awareness, planning, problem solving, monitoring, assessing, correcting, evaluating
- More difficult to measure in traditional ways.

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## A paradigm shift...

### Knowledge Base

#### The What

- Curriculum
- Specialized programs

### Metacognition

#### The How

- Strategies
- Process

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## Knowledge Base



Vocabulary: Give it a label

Define/describe: Give it meaning

Talk through it: Give the student experience using it.

Repetition: Give it time and overlearn it.

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With a knowledge base, children realize there are shortcuts to solving a problem.

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## Metacognition can be broken down into two areas:

### Metacognitive Knowledge

"Reflecting on what we know"



### Metacognitive Regulation

"Executive Control: Directing our learning"



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**“Reflecting on what we know”****Awareness of Knowledge**

Awareness of what a student knows  
 “I know this. I don’t know that.”

**Awareness of Thinking**

Understanding of tasks  
 and what it takes to complete the task.

**Awareness of Thinking Strategies**

Understanding of approaches to direct learning

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**Awareness of Knowledge**

Awareness of what a student knows.

**Children can be guided in what they know and do not know.**

- Ensure nonjudgmental interactions. It’s okay not to know.
- Give a structure to follow: K-W-L charts
- Tell me what you do know. Let’s start there.  
 Talk through the topic and help the child determine what he knows  
 and does not know. This takes time. Make it simple.
- Use guided question techniques.
- Don’t accept “I forgot.” as an answer to a question.
- Practice saying “I know this.” and “I don’t know that.”

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**Awareness of Thinking**

Understanding of tasks  
 and what it takes to complete the task.

Give the student the structure/schema for the assignment.

- Learning Recipe: What supplies to do you need?
- What steps will you take?
- Use Rubrics
- Add an H (How) to K-W-L chart

Checking for understanding:

- Can the student restate what he is to do?

Set goals for the assignment

- How long will this take you?
- Do you have what you need to do the project?

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## Awareness of Thinking Strategies

Understanding the approaches needed to direct my learning.

Provide a range of resources and how to use them

Talk through learning strategies that might be used successfully

Encourage students to ask self monitoring questions

Encourage and provide a time for reflection

Teach study strategies that ask students to think about the way they learn.

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## Metacognitive Regulation

Executive Control: Directing our Learning

Managing and Overseeing One's Thinking

Thinking strategically

Problem Solving

Setting Goals

Organizing Ideas

Evaluating

Making the thinking process visible to others

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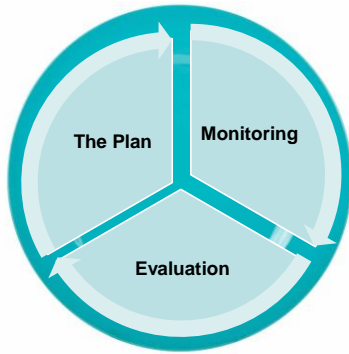
## Teaching a strategy: Being Deliberate

1. Identify the target behavior with the student. This should be presented in positive terms.
2. Explain that there are strategies that can help the student.
3. Name the strategy and define it.
4. List pros and cons of using the strategy and not using it (Make the purpose of the strategy clear).
5. Make using the strategy "come alive" through pictures, role plays, scenarios and social stories. This should occur before the student uses the strategy.
6. Help the student talk through the strategy.
7. Give student opportunities to use the strategy with support and reinforce use with rewards. Set up situations in an individual or small group setting where the student uses the strategy successfully.
8. As the student begins using the strategy, fade support and reinforce use with rewards.
9. Monitor use of the strategy and reinforce with rewards.

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### The Plan

- Access Prior Knowledge
  - Talk through
  - K-W-H-L
  - Brainstorming
  - Research and knowledge acquisition
- Make a decision about strategies and processes
- Set goals
- Develop Timelines
  - Calendar
  - Planners
  - Phone
- Use or create rubric

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### Monitoring

- Check the Processes
- Check the Timeline
- Compare Completed Work to Rubric
- Self monitoring questions
  - Am I on the right track?
  - Do I need to revise my plan?

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## Evaluation

- Complete the rubric. Determine if this is the finished product.
- Evaluate the completeness and quality of the work
- Determine what worked well and what did not. What would you have done differently?

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## Student: John

John is in 6th grade. He has struggled through school, but has always passed his grade. In class he appears to be working. When questioned, he can not verbalize what he is suppose to be doing. He has no plan for his assignments and no goals. He rarely turns in his homework. He has trouble finding errors in his work, and yet, has difficulty accepting help or corrective criticism. He becomes frustrated. The quality of his work is below what he is capable of doing and he seems OK with that. He is unaware of his strengths and weaknesses.

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The Industrial Revolution Project Rubric Name:

Category	4	3	2	1
Paragraph	Paragraph was well written with great detail. Explained in great detail why the Industrial Revolution was a turning point in U.S. history. No errors in capitalization, punctuation and structure.	Paragraph was well written with good detail. Explained in good detail why the Industrial Revolution was a turning point in U.S. history. 2 or less errors in capitalization, punctuation and structure.	Paragraph was well written with some detail. Explained in detail why the Industrial Revolution was a turning point in U.S. history. 3 or more errors in capitalization, punctuation and structure.	Paragraph was well written with few details. Explained with little detail why the Industrial Revolution was a turning point in U.S. history. 4 or more errors in capitalization, punctuation and structure.
Venn Diagram	Venn Diagram compares and contrasted two people who worked during the Industrial Revolution. Each circle has a minimum of 5 contrasts or comparisons.	Venn Diagram compares and contrasted two people who worked during the Industrial Revolution. Each circle has a minimum of 4 contrasts or comparisons.	Venn Diagram compares and contrasted two people who worked during the Industrial Revolution. Each circle has a minimum of 3 contrasts or comparisons.	Venn Diagram compares and contrasted two people who worked during the Industrial Revolution. Each circle has a minimum of 2 or less contrasts or comparisons.
T-Chart	T-chart compares before and after the Industrial Revolution. The chart has at least 5 differences before and after the Revolution.	T-chart compares before and after the Industrial Revolution. The chart has at least 4 differences before and after the Revolution.	T-chart compares before and after the Industrial Revolution. The chart has at least 3 differences before and after the Revolution.	T-chart compares before and after the Industrial Revolution. The chart has 2 or less differences before and after the Revolution.

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## K-W-H-L

What I Know	What I Want to Know	How I will gather information	What I learned

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write on 2

Name \_\_\_\_\_

Goal Organizer: 5W's and H

Where will I work on my goal?	Who will help me reach my goal?
What my goal is	
When will I achieve my goal?	
Why is this goal important to me?	How will I reach my goal?

Long: ThomasHickman.com ©

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## Student: John

In class he appears to be working. When questioned, he can not verbalize what he is suppose to be doing.: He has accessed background knowledge and has talked through the information and the process.

He has no plan for his assignments and no goals.

He has a plan and goals.

He has trouble finding errors in his work, and yet, has difficulty accepting help or corrective criticism:

The plan for finding errors and corrective criticism is built into the rubric. There is no emotion attached to it.

The quality of his work is below what he is capable of doing and he seems OK with that.

The rubric addresses quality and he has the tools and support for creating quality work.

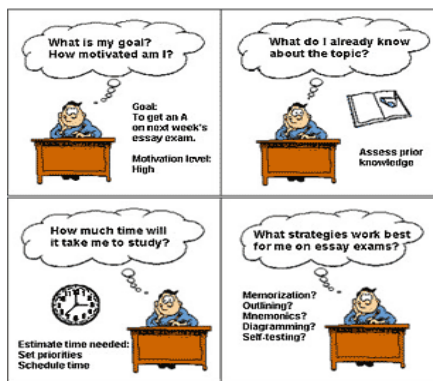
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